Claims

1. Process for the arc welding in pulsed mode of one or more workpieces made of carbon steel, stainless steel, aluminium or aluminium alloy, with the use of a gas shield, in which an electric arc welding torch is supplied with at least one consumable wire at a wire feed speed (V_{wire}) and the said consumable wire is subjected to current pulses, in order to melt the end of the said consumable wire and to detach a drop of molten metal by a current impulse, and in which, for a given pulse frequency, a wire feed speed (V_{wire}), a mean current (I_{mean}) value and an rms current (I_{rms}) value such that:
$I_{mean} = A_1V_{wire} + B_1$, where $5 < A_1 < 45$ and $0 < B_1 < 50$
and
$I_{rms} = A_2V_{wire} + B_2$, where $5 < A_2 < 45$ and $40 < B_2 < 100$,
where I_{mean} and I_{rms} are expressed in amps and V_{wire} is expressed in m/min, are chosen and/or used.

2. Process according to Claim 1, characterized in that the workpiece or workpieces to be welded are made of carbon steel and in that the mean current (I_{mean}) value and the rms current (I_{rms}) value, such that:
$I_{mean} = A_1V_{wire} + B_1$, where $20 < A_1 < 40$ and $0 < B_1 < 30$
and
$I_{rms} = A_2V_{wire} + B_2$, where $19 < A_2 < 39$ and $40 < B_2 < 100$,
where I_{mean} and I_{rms} are expressed in amps and V_{wire} is expressed in m/min, are chosen.

3. Process according to Claim 1, characterized in that the workpiece or workpieces to be welded are made of stainless steel and in that the mean current (I_{mean}) value and the rms current (I_{rms}) value, such that:
$I_{mean} = A_1V_{wire} + B_1$, where $10 < A_1 < 40$ and $0 < B_1 < 40$
and

$I_{rms} = A_2V_{wire} + B_2$, where $9 < A_2 < 39$ and $40 < B_2 < 100$, where I_{mean} and I_{rms} are expressed in amps and V_{wire} is expressed in m/min, are chosen.

4. Process according to Claim 1, characterized in that the workpiece or workpieces to be welded are made of aluminium or aluminium alloy and in that the mean current (I_{mean}) value and the rms current (I_{rms}) value, such that:

$I_{mean} = A_1V_{wire} + B_1$, where $5 < A_1 < 30$ and $0 < B_1 < 20$ and

$I_{rms} = A_2V_{wire} + B_2$, where $5 < A_2 < 25$ and $40 < B_2 < 65$, where I_{mean} and I_{rms} are expressed in amps and V_{wire} is expressed in m/min, are chosen.

5. Process according to one of Claims 1 to 4, characterized in that the wire feed speed (V_{wire}) is between 1 and 20 m/min, preferably between 2 and 15 m/min.

6. Process according to one of Claims 1 to 5, characterized in that the pulse frequency is between 20 and 300 Hz, preferably between 50 and 200 Hz.

7. Process according to one of Claims 1 to 6, characterized in that the ratio (I_{rms}/I_{mean}) of the rms current (I_{rms}) value to the mean current (I_{mean}) value is between 1.05 and 2, preferably between 1.1 and 1.8.

8. Process according to one of Claims 1, 2 or 5 to 7, characterized in that the workpiece or workpieces to be welded are made of carbon steel and in that the ratio (I_{rms}/I_{mean}) of the rms current (I_{rms}) value to the mean current (I_{mean}) value is between 1.05 and 2, preferably between 1.05 and 1.6.

9. Process according to one of Claims 1, 3 or 5 to 7, characterized in that the workpiece or workpieces to be welded are made of stainless steel and in that the ratio (I_{rms}/I_{mean}) of the rms current (I_{rms}) value to the mean current (I_{mean}) value is between 1.05 and 2, preferably between 1.1 and 1.8.

10. Process according to one of Claims 1 or 4 to 7, characterized in that the workpiece or workpieces to be welded are made of aluminium or aluminium alloy and in that the ratio (I_{rms}/I_{mean}) of the rms current (I_{rms}) value to the mean current (I_{mean}) value is between 1.05 and 2, preferably between 1.05 and 1.5.

11. Process according to one of Claims 1 to 10, characterized in that the gas shield consists of a gas or gas mixture chosen from helium, argon, carbon dioxide, oxygen, nitrogen and hydrogen and/or in that the consumable wire has a diameter of between 0.6 mm and 2.2 mm, preferably between 0.8 mm and 1.6 mm.

12. Process according to one of Claims 1 to 11, characterized in that the welding is of the pulsed MIG or pulsed MAG type and in that the wire is a solid wire or a flux-cored wire.

13. Pulsed arc welding device, capable of implementing a process according to one of Claims 1 to 12, comprising:
- frequency selection means for setting, adjusting or selecting a pulse frequency;
- wire speed selection means for setting, adjusting or selecting a wire feed speed (V_{wire});
- means for determining the mean current (I_{mean}) and rms current (I_{rms}) values making it possible to determine or calculate at least one mean current

(I_{mean}) value and at least one rms current (I_{rms}) value such that:

$I_{mean} = A_1V_{wire} + B_1$, where $5 < A_1 < 45$ and $5 < B_1 < 50$ and

$I_{rms} = A_2V_{wire} + B_2$, where $5 < A_2 < 45$ and $45 < B_2 < 110$, where I_{mean} and I_{rms} are expressed in amps and V_{wire} is expressed in m/min; and

- current adjustment means for adjusting the welding current in response to the determination or calculation of the mean current (I_{mean}) and rms current (I_{rms}) values by the said means for determining the mean current (I_{mean}) and rms current (I_{rms}) values;
- preferably it includes or consists of at least one welding current generator.

14. Welding unit comprising at least one device according to Claim 13, at least one welding torch, at least one source of welding wire and at least one source of shielding gas.